

WHAT IS CLAIMED IS:

1. An exposure method comprising the steps of:

a) removing an unwanted deposited film from the surface of a photomask, a desired pattern having been formed in the photomask; and

b) exposing a resist film to extreme ultraviolet radiation through the photomask, from which the deposited film has been removed, thereby transferring the desired pattern onto the resist film.

2. The method of Claim 1, wherein the step a) comprises removing the deposited film using oxygen plasma.

3. An exposure method comprising the steps of:

a) loading a substrate, on which a resist film has been formed, into a vacuum chamber;

b) removing an unwanted deposited film from the surface of a photomask having a desired pattern therein inside the vacuum chamber by using oxygen plasma that has been generated in the chamber; and

c) exposing the resist film to extreme ultraviolet radiation through the photomask, from which the deposited film has been removed, thereby transferring the desired pattern onto the resist film.

4. An exposure method comprising the steps of:

- a) removing an unwanted deposited film from the surface of a photomask having a desired pattern therein inside a first vacuum chamber by using oxygen plasma that has been generated in the first vacuum chamber;
- b) loading a substrate, on which a resist film has been formed, into a second vacuum chamber;
- c) transporting the photomask, from which the deposited film has been removed, in line from inside the first vacuum chamber to inside the second vacuum chamber; and
- d) exposing the resist film to extreme ultraviolet radiation through the photomask inside the second vacuum chamber, thereby transferring the desired pattern onto the resist film.

5. An exposure apparatus comprising:

- a vacuum chamber;
- a substrate holder placed inside the vacuum chamber to hold a substrate thereon, a resist film having been formed on the surface of the substrate;
- an optical system disposed inside the vacuum chamber and used for exposing the resist film to extreme ultraviolet radiation through a photomask, in which a desired pattern has been formed, and thereby transferring the pattern from the photomask onto the resist film;

means for introducing oxygen gas into the vacuum chamber; and

means for generating a plasma out of the oxygen gas that has been introduced into the vacuum chamber.

6. An exposure apparatus comprising:

a first vacuum chamber;

means for introducing oxygen gas into the first vacuum chamber;

means for generating a plasma out of the oxygen gas that has been introduced into the first vacuum chamber;

a second vacuum chamber;

a substrate holder placed inside the second vacuum chamber to hold a substrate thereon, a resist film having been formed on the surface of the substrate;

an optical system disposed inside the second vacuum chamber and used for exposing the resist film to extreme ultraviolet radiation through a photomask, in which a desired pattern has been formed, and thereby transferring the pattern from the photomask onto the resist film; and

means for transporting the photomask associated with the optical system in line from inside the first chamber to inside the second chamber or vice versa.